

PATENT ABSTRACTS OF JAPAN

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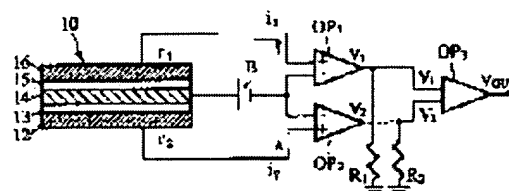
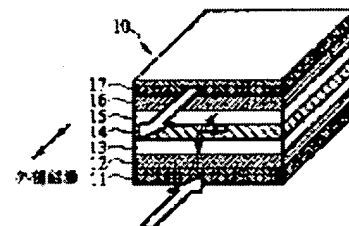
(54) MAGNETIC SENSOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a magnetic sensor improved in signal-to-noise ratio and high in magnetic field sensitivity by detecting an external magnetic field based on tunnel resistances among magnetic substance layers and obtaining the difference between resistances which are complementarily changed under the external magnetic field.

SOLUTION: An antiferromagnetic body layer 11 and an antiferromagnetic body layer 17 mutually reversibly pin the magnetization direction of a ferromagnetic body layer 12 and the magnetization direction of a ferromagnetic layer 16. Consequently, magnetizations of the layer 12 and the layer 16 are pinned to directions opposite with each other. The corrective force of a soft magnetic material layer 14 is small and the direction of magnetization of the layer 14 freely rotates according to the external magnetic field.

The direction of the axis of easy magnetization of the layer 14 intersects the magnetization directions of the layer 12, 16 roughly at right angles. Static magnetic fields by the layer 12, 16 are made to be canceled with each other on the layer 14 by adjusting ferromagnetic materials and the thicknesses of the layers 12, 16. When resistances of respective tunnel junctions between the layer 16 and the layer 14 and between the layer 14 and the layer 12 are defined as r_1 and r_2 , resistances r_1 , r_2 are complementarily changed by a spin tunnel phenomenon when the magnetization direction of the layer 14 is changed by the external magnetic field. Then, the difference of these changes is detected.



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